

USAID-Funded Flood and Tsunami Mitigation Programs

This report reviews USAID's disaster mitigation programs over the past twenty years, focusing specifically on projects that were designed, wholly or in part, to mitigate the effects of floods (coastal or inland) caused by natural phenomena such as tsunamis, hurricanes, cyclones, or monsoons.

Defining "Mitigation"

USAID's Office of Foreign Disaster Assistance defines a disaster mitigation project as one that, "...concentrates on reducing the harmful effects of a disaster. While accepting that disasters will occur, mitigation projects, like installing hurricane straps to reduce wind damage to roofs, limit their effects on human suffering and economic assets."¹ The University of Rhode Island's Coastal Resources Center hazard mitigation to be 1) sustained action to reduce risk to property, human life, natural resources and economic health of our communities, and 2) action that has long-term impacts and benefits.²

Over the past twenty years, USAID has implemented at least 34 flood and tsunami mitigation programs in approximately 25 countries. Major approaches have included training, information dissemination and exchange, research, surveying nutrition and food security, communication systems development, risk assessment and early warning systems, improving building codes and standards, technical assistance, and increasing host country capacity.

Africa

In Africa, USAID has implemented ten programs in seven countries – Chad, the Democratic Republic of Congo, Madagascar, Mali, Mozambique, and Somalia – as well as one regional program in Southern Africa. USAID flood mitigation work in Africa has mainly concentrated on providing funding and/or commissioning extensive research projects on how African countries can better prepare for natural disasters. OFDA work vis-à-vis floods has been the norm in the region. Where USAID has focused on natural disaster mitigation in Africa, the focus has been primarily on food security and not flood mitigation.

Asia and the Near East

In Asia and the Near East, USAID has carried out eleven flood and tsunami mitigation programs, five of which are in Bangladesh. Other countries include Egypt, India, Indonesia, Nepal, Pakistan, and the Philippines, as well as additional countries covered through a regional program. USAID's flood mitigation work in Asia and the Near East ranges from nutrition surveys, large research projects and publications, and workshops to building construction and strengthening communication capacity.

Eastern Europe and the New Independent States

Three flood mitigation initiatives were found for this region, one in Poland, one in Tajikistan, and a regional program covering the Sava River Basin, which includes Bosnia and Herzegovina, Serbia-Montenegro, and Croatia. These programs have employed such innovative programs as a "Flood Aid Fair" and relocating an entire community.

¹ OFDA (1992) *OFDA Annual Report FY 1991*, p. 6.

http://www.usaid.gov/our_work/humanitarian_assistance/disaster_assistance/publications/annual_reports/pdf/AR1991.pdf

² Coastal Resources Center, URI (2000) *International Newsletter of Coastal Management, Intercoast Network*, no. 35, "Focus on Natural Disasters", p. 1. http://www.dec.org/pdf_docs/PNACP236.pdf.

Latin America and the Caribbean

In this region, there were ten flood and tsunami programs. The majority of them were in response to hurricanes Georges and Mitch. There were four regional initiatives in all. Other countries in which USAID implemented flood and tsunami mitigation programs were Chile, Ecuador, El Salvador, Guatemala, Haiti, and Nicaragua.

Overall Lessons Learned

A wide spectrum of people and agencies that make major decisions about mitigation activities should be included in disaster mitigation policy and planning, for example, public works departments and planning agencies.¹

By engaging communities in locally driven mitigation activities, governments strengthen disaster response capabilities while also laying the ground work for sustainable development at the local level.²

Disaster mitigation programs can be an opportunity to facilitate and improve communication among different institutions and stakeholders.

- In Niger, for instance, the Disaster Preparedness and Mitigation Program improved communication among national and subnational structures, between government and village organizations, and between village organizations and individual villagers, thus strengthening the capacity of the Government of Niger to respond more effectively to vulnerable populations.³

Convening a wide array of organizations, donors, and firms can help identify gaps and direct resources to those in need.

- Information collected at the Flood Aid Fair in Poland exposed gaps in available resources to meet existing needs among the victims of the 1997 flood. This helped direct resources where they were most needed and helped facilitate an equitable distribution of those resources.⁴

Flexibility in local conditions and adaptability to local circumstances is needed.

- This lesson is exemplified by a Tajikistan project that was assisting flood affected populations by constructing a new community in a region that was not subject to flooding. The original plan called for the use of handmade, sun-cured bricks, but delays resulted in the majority of the construction taking place during the winter months. Insufficient bricks were made to meet demand due to weather-induced complications in production processes, as handmade bricks are vulnerable to wet weather and take longer to cure in the cold. Project managers solved the problem by purchasing a limited amount of gas fired bricks - impervious to environmental conditions - from a local manufacturer. In addition, recycled bricks were procured from a demolition company that was removing derelict buildings from the region. These bricks were used to construct the exterior shell of the homes, while the handmade bricks were used to construct the interior walls. Not only did the construction quality remain high and the project finished on time, the overall cost of each house was also reduced.⁵

Community-based flood monitoring and early warning systems are of great value.

- This was illustrated by heavy flooding in the Yoro Department of Honduras, a CAMI-supported flood monitoring and early warning system. The community-based disaster preparedness system allowed for an early alert and timely evacuation of at-risk populations during massive flooding in late 2001 in Yoro, an area which experienced major devastation because of Hurricane Mitch just three years earlier.⁶
- This point is reinforced in the Madagascar cyclone recovery project.⁷

While hazard mapping and technical risk assessments are essential components of disaster management, there are many challenges associated with them, including cost and host-country capacity.

- They are complex and costly, and thus difficult to justify to the public.
- Government departments with responsibility for implementing these studies need, but frequently do not have, all the skills or the resources to carry out these studies. There needs to be a home in each country for these types of activities.
- The Caribbean Disaster Mitigation Project's storm surge maps produced for Belize were instrumental in the government's decision to order an evacuation of coastal areas prior to Hurricane Mitch. The maps, however, were not used in every country for which they were developed.⁸

Building standards, codes, and good practice are an essential part of an effective mitigation initiative.

- The Caribbean Disaster Mitigation Project encouraged the development of building codes that would contribute to a reduction in vulnerability and promoted the retrofitting of low-cost housing to make them hurricane resistant. However, the home retrofit programs turned out to be complicated and slow to have an impact; development of cost effective retrofit options and guidelines for existing shelters is needed. Also, building codes require enforcement and effective government agencies to be effective, something which had not yet happened in the region. More attention to land use considerations, e.g., not building in high risk areas, needed to be given.⁹

Moving a community and building in a new area may be the best means of mitigating the effects of future floods.

- A project in Tajikistan assisted flood affected populations by constructing a new community in a region that was not subject to flooding.¹⁰

Property insurance and the insurance industry can help promote flood mitigation activities.

- The Caribbean Disaster Mitigation Project worked with the insurance industry to promote insurance rates that would lead to reductions in losses from disasters and to promote hazard mitigation activities through workshops and a Caribbean government joint initiative on insurance. Though this aspect of the project appeared well designed to the evaluators, it did not achieve desired benefits as the insurance industry continued to average risks in determining premiums, rather than providing reduced premiums for improved structures, and structures in lower-risk areas.¹¹

Partnerships with regional institutions can greatly facilitate the implementation of disaster mitigation actions.

- For instance, in a project to improve the Central American regional capacity to mitigate transnational effects of disasters, partnerships with institutions such as the Central American Commission on Environment and Development (CCAD) and the Regional Committee on Hydrologic Resources by: a) undertaking regional tasks; b) serving as a liaison between USAID and national level institutions.
- In addition, the benefits of a regional action to reduce the impact of disasters are not equally divided among countries. For example, a flood forecast system benefits downstream countries more than those upstream. Accordingly, when only national interests are considered, upstream countries tend to demonstrate only limited interest in this category of activity. By working with regional organizations, the regional integration and collaboration flag can be raised to foster active participation by all countries involved. The activities also should include some elements that benefit the upstream country institutions such as capacity building.¹²

Annex: A Compendium of USAID-Funded Flood and Tsunami Mitigation Activities

Africa

REGIONAL - SOUTHERN AFRICA

Southern Africa Development Community Disaster Management Committee. USAID helped to institute and continues to fund the *Southern Africa Development Community Disaster Management Committee*. USAID and others helped the SADC to develop a regional disaster management mechanism off the ground following the devastating floods in southern Africa in early 2000. SADC held a founding meeting in January 2001 (funded by USAID) that included representatives from a number of multilateral as well as bilateral disaster, relief and development donors in addition to country representatives to ascertain country needs and then devise strategies for improving disaster mitigation and response. OFDA was tapped to be a leader in disaster management training for SADC and individual countries in the region. (Southern Africa Development Community Disaster Management Committee and Technical Seminar, 2001; pp. 1-15)¹³

CHAD

Flood Mitigation and Water Management. “Water Management” was one of four different PVO initiatives contracted out by the USAID Mission in Chad in the mid- to late 1980s that included flood mitigation in addition to other water management initiatives. Specifically: “The control of flash flooding, which is common in the wadis, will bring new areas of land into production. By constructing gabion terraces and wadi check dams, water will be spread over a large area, thus both slowing its speed and allowing fertile sediment to be deposited. Benefits for increased crop production include: control of high-energy flood waters, development of new cropping areas; recurrent deposit of fertile silt over crop areas; and improved water-holding capacity of crop soils...[An] evaluation of the various dams and water diversion devices tested under the AFDP will lead to a joint Africare-AID decision to construct more of the best-designed structures.”¹⁴ (PVO Development Initiatives in Chad, 1987; p. 17)

DEMOCRATIC REPUBLIC OF CONGO

Flood Water Runoff Reduction and Management. “In May 1998, USAID/OFDA funded a project through CRS to help remove the build-up of sand and mud from two communes of Kinshasa where torrential rains affected up to 100,000 residents. Commune families suffered direct economic losses of nearly \$7.1 million, or the equivalent of approximately 55% of the annual average family income. In May 1998, USAID/OFDA provided additional funding to CRS for a project to reduce and manage flood-water runoff. In the next year, CRS was able to mobilize the community to construct 17 small dams, made from bamboo cuttings, grass, and sandbags; strengthen water retention basins; and clean clogged canals. These measures were tested repeatedly during the 1999 rainy season, when torrential rains again hit Kinshasa in February. Although two of the 17 dams failed, no flood-related damage was sustained in the two communes, no residents were injured or displaced, and no livelihoods were affected. As a result of this USAID/OFDA ‘investment,’ more than 100,000 residents were spared the economic losses that they otherwise would have faced as a result of the 1999 floods. The success of this mitigation project eliminated the need for USAID/OFDA assistance in FY 1999.” (OFDA FY 2000 Annual Report, p. 25-26)¹⁵

MADAGASCAR

1. Cyclone Recovery Program “In the early months of the Year 2000 Cyclones Eline and Hudah and Tropical Depression Gloria swept out of the southwest Indian Ocean crossing Madagascar and the Mozambique Channel and striking the southeast coast of the African continent. The high winds, heavy rains, landslides and flooding took their toll especially in Madagascar, Mozambique and Botswana.” The

follow-up to the immediate OFDA assistance has been additional funds to ongoing projects: Chemonics, Inc.'s Landscape Development Interventions and two other projects managed by Rehabilitation du Capital Routier (ReCAP) and Finanarantsoa Cote-Est—Rehabilitation (FCE-R). The funding has been used to repair farm-to-market roads, repair and rehabilitate irrigation systems, provide training and assistance with grain stores, fish ponds and to facilitate local community planning to better prepare for future cyclones as well as to establish and train local community association to manage and maintain those roads, repair Manakara's port facilities and to rehabilitate and maintain the important Fianarantsoa to Manakara rail line.

Approximately US \$2.6 million was disbursed between September 2000 through January 2001. Overall judged to be successful in rehabilitating dams and irrigation systems; distributing seed; constructing agricultural supply centers and village granaries; assisting villages in developing disaster mitigation plans; and repairing road sections in the Province of Fianarantsoa. The decentralized and participatory approach taken by LDI was deemed to have worked well. The cyclone and disaster mitigation plans developed in the region as a result of the project were deemed highly successful and the evaluators recommended that similar plans be developed at the local level across the country. (Dennison, 2002)¹⁶

2. Southern Africa Floods Supplemental Appropriation. “Madagascar's needs were aggregated with those of Mozambique, South Africa, and other affected countries into a request for the greater Southern Africa Floods Supplemental Appropriation. The Emergency Supplemental Appropriation for the Southern Africa Flood Reconstruction Program (Tranche I) under Public Law 106-246, provided \$25 million to assist in the repair of the damage caused by the cyclones, of which Madagascar received \$3 million. A second Emergency Supplemental Appropriation (Tranche II), under Public Law 106-429, provided Madagascar an additional \$14 million for repairs, health services and disaster preparedness. To assist in implementing the objectives of the Supplemental Appropriation, USAID/Madagascar awarded a cooperative agreement to Population Services International and made modifications to an existing contract awarded to John Snow, Inc.

Population Services International was awarded a cooperative agreement for \$1.2 million to accelerate the production, commercial distribution, and household use of the sodium hypochlorite solution *Sur'Eau* “safe water.” This product improves household water quality and decreases diarrheal disease. The agreement calls for distribution in key regional centers to mitigate the spread of cholera and other water-borne diseases in cyclone-affected and cyclone-vulnerable areas in Madagascar.

John Snow, Inc. was awarded a contract to provide technical assistance services to the Mission to meet defined performance measures necessary for the achievement of “smaller, healthier families.” Two contract amendments provided a total of \$1.5 million to provide additional activities to reduce the morbidity and mortality of cyclone-related diseases.” (Concurrent Audit of USAID/Madagascar's Performance Monitoring, <http://www.usaid.gov/oig/public/fy02rpts/4-687-02-005-p.pdf>)¹⁷

MALI

Pilot Flood Mitigation Project. “In Bamako, USAID/OFDA is supporting a project that could serve as a model of sustainable action in other African cities. USAID/OFDA provided Action Against Hunger (AAH/USA) with a one-year (July 2000 – June 2001) grant of \$294,000 for a pilot flood mitigation project in the Banconi District of Commune 1, one of Bamako's fastest growing, most densely populated, poorest, and most under served sections. During the 1999 floods, 416 families in the Banconi District were affected by flash flooding from nearby cliffs. Of Banconi's total population of approximately 200,000, more than 111,000 residents live in areas at high-risk for flood damage.

In July 2000, USAID/OFDA sent a two-person team to Bamako to help launch its newly funded flood mitigation project. First, AAH/USA aimed to limit the uncontrolled flow of rainwater by constructing

catchment basins, reinforced fragile creek banks with stones packed in iron wire, and planted trees along water-ways. One of the key aspects of AAH/USA's project is its effort to improve solid waste management practices in the community.

Under the project AAH/USA constructed four transit dumpsites and worked with community members, municipal sanitation services, and private garbage collection companies to clean refuse from waterways, and establish a sustainable system for garbage collection, disposal, and recycling. In addition, AAH/USA used education and training modules to increase awareness of flood hazards and hygiene (and its connection to water-borne diseases) among school children, the general public, and public officials. This includes periodic community clean-up days, complete with festive music and food. The project seeks to promote livelihoods by linking garbage collection, recycling, and composting with urban agriculture (forestry, livestock, and fisheries), particularly along waterways and drainage ditches. USAID/OFDA expects that the pilot flood mitigation project in Bamako will serve as a model for other community-based natural hazard reduction activities in urban settings throughout Africa or other vulnerable regions of the world." (OFDA FY 2000 Annual Report, p. 25-26)¹⁸

MOZAMBIQUE

Southern Africa Flood Reconstruction Program. "To provide assistance for southern African countries affected by this flooding, the U.S. Congress appropriated \$25 million in fiscal year 2000 for the Southern Africa Flood Reconstruction Program. The following year, Congress appropriated an additional \$135 million for the same purpose. Of those amounts, USAID/Mozambique received \$132 million, \$35 million of which was allocated to rehabilitate and reconstruct roads damaged by the floods. The remaining \$97 million was programmed for other emergency uses, such as railroad rehabilitation and agricultural programs.

In a joint effort with the Government of Mozambique, USAID/Mozambique identified four key road segments and one major bridge to finance—in part—with supplemental appropriations funding. To implement these activities, USAID/Mozambique awarded direct contracts to two engineering consulting firms to design and supervise the reconstruction of the four road segments and the bridge. In addition, host-country contracts were awarded to three construction firms by the Government of Mozambique for the road and bridge repair and reconstruction. USAID/Mozambique was to provide 94 percent of the funding and indirectly monitor the construction contractors through the engineering consulting firms. To determine the Government of Mozambique's capability to handle this arrangement, USAID/Mozambique conducted an assessment of the host country's procurement system and certified its capability in accordance with USAID requirements... USAID/Mozambique generally implemented and monitored its road and bridge repair and reconstruction activities in accordance with USAID policies and procedures." However, all parts of the project took longer than expected to be completed. (Audit of USAID/Mozambique's Performance, <http://www.usaid.gov/oig/public/fy03rpts/4-656-03-001-p.pdf>)¹⁹

NIGER

Disaster Preparedness and Mitigation Program. "The Mission proposed and funded a *Disaster Preparedness and Mitigation Program* (DPM) in the early 1990s. By engaging communities in locally driven mitigation activities, the DPM program strengthened the [Government of Niger's] disaster response capabilities while also laying the ground work for sustainable development at the local level.... The types of mitigation activities undertaken by the communities included the construction of micro-catchments to enhance the water retention capacity of agricultural grazing lands, wells for vegetable production, firebreaks, flood diversion dikes, situation dams, anti-erosion water diversion structures, and semi-lunes to expand rangeland vegetation. Most of the projects involved a food-for-work component... The DPM program was able to meet the emergency food needs of people who were not able to find work, especially during the dry season, and at the same time improve rural infrastructure, agricultural production, economic production, and the local environment. A military coup on January 27,

1996, and subsequent election fraud obligated the Mission to terminate all bilateral aid to Niger. While direct assistance from USAID to the GON has been terminated, locally initiated disaster mitigation activities continued through CARE.... Although only a relatively small number (68) of mitigation activities were completed before the closeout of the Mission and their long-term effects are not yet evident, each of the projects engaged civil participation and local initiative. The Disaster Preparedness and Mitigation program under the auspices of SAP/GC improved communication among national and subnational structures, between government and village organizations, and between village organizations and individual villagers, thus strengthening the capacity of the GON to respond more effectively to vulnerable populations.

At the national level, the GON was able to incorporate community-driven initiatives to national food security strategies. National level officials developed practices to respond more effectively to constituents. The regional committee members learned how, when, and why to transfer information gained from the national level to the local level, and from the local level to the national level. At the village level, individuals gained the skills and experience necessary to take a more active role in problem identification, prioritization, and resolution. The villagers' active participation also enabled them to find channels to articulate and propose solutions to future problems.” (“Promoting Village Participation in Disaster Mitigation,” http://www.usaid.gov/about/part_devel/docs/prtpract7.html.)²⁰

SOMALIA

Baardheere Dam Project. In the mid-1980s, the USAID Mission in Somalia commissioned research on the project design of the proposed Baardheere (sometimes also referred to as the Baardhere) Dam Project in Somalia. James E. Stephenson, Engineering Consultant, prepared a review and presented his findings to USAID in January 1986. One of the proposed rationales for the building of the dam was for flood control. As Stephenson writes: “The dam and its associated detention reservoir would eliminate annual flooding downstream, except for a most unusual hydrometeorological event, by regulating flood flows to a rate that would keep the river within its banks.”²¹ While Stephenson concluded that the project design was sound and recommended that the project go forward, neither USAID nor any other donor has provided the funds necessary to build the dam and to date, the proposed dam has not been built. (Stephenson, 1986)

Asia and the Near East

REGIONAL

Regional Cooperation in Flood Forecasting and Prevention This program brought together decision-makers and technical personnel from the Hindu Kush-Himalayan Region to promote collaboration and share information related to flood management, flood early-warning systems, and broader trans-boundary water issues in the region. Forums were hosted by the International Center for Integrated Mountain Development (ICIMOD) based in Kathmandu, Nepal. Consultative teams made assessments of the collaborating national institutions and recommended linkages and mechanisms required for a regional flood-information system. Bangladesh, Bhutan, Burma, China, India, Nepal, and Pakistan participated in the program, which began in November 2001 and continued through March 2004. As of January 2004, total USAID/OFDA funding was \$250,860. The U.S. Department of State's Regional Environment Office provided an additional \$100,000.²²

BANGLADESH

1. Irrigation Support Project for Asia and the Near East (ISPAN) ISPAN began in 1986, and its scope was expanded in 1988 when a major study was commissioned to examine the broad context of floods in Bangladesh. With ISPAN support, three noted experts produced the Eastern Waters Study (EWS) in 1989. This was the beginning of the USAID commitment, with a number of other countries, to support the Bangladesh Flood Action Plan (FAP). To date, \$7.9 million has been committed to the Eastern Waters Initiative (EWI) under ISPAN implementation. As a result of EWI, the initial contract period spending ceiling was raised by \$5.0 million to \$20.1 million in 1990.

The objectives of the Eastern Waters Initiative were to:

- Provide a team to conceptualize, plan, implement and manage the EWI Program;
- Develop the EWI Program cooperatively with the regional governments' own activities in the Ganges and Brahmaputra River Basins;
- Provide a mechanism for USAID to implement its policy initiatives for water and agricultural development in the region; and
- Ensure continued communication and cooperation with the World Bank and other multilateral and bilateral donors working in the EWI region.

Evaluations²³ of ISPAN found that the Flood Action Plan activity in Bangladesh proved a creative exception to the normal rules for Mission buy-ins. If USAID/Bangladesh had been forced to go through the normal design or contracting processes, the needed technical support would have arrived too late to be effective.

Other lessons learned included:

- The broadening of ISPAN's agenda to include all aspects of water resources development and conservation increased the project's utility.
- If an ISPAN-like mechanism is to perform optimally, USAID management and contracts personnel must be prepared to support new approaches to novel TA situations.
- Field experience is more valuable than purely technical and/or general knowledge in implementing water resource projects.
- The ISPAN experience suggests that universities may be better suited to core-funded applied research and synthesis activities, rather than short-term consultancies, because of teaching and other contractual obligations that can limit flexibility of university scientists. Conversely, consulting firms are more appropriate for short-term consultancies.

2. Integrated Food for Development (IFFD) Project. This program ran from 1996 to 1999. It was funded at \$10.4 million plus Title II commodities, which totaled \$99.2 million. There were two parts to this program, road rehabilitation and disaster preparedness. Disaster preparedness consisted of flood proofing pilot activities and disaster preparedness and response planning. Flood proofing activities focused on homestead ground raising and platform activities in flood prone areas, and also included provision of clean drinking water, flood preparedness, erosion protection and other activities. (In 1997 funds were added to the road rehabilitation part to finance flood mitigation measures such as tree planting and slope stabilization, but were not covered by the mid-term evaluation that we are using). Flood proofing pilot activities began in 1996 with planning and actual physical work. At the time of the midterm evaluation activities in 11 villages had been undertaken with activities planned in 115 villages total. Unfortunately the midterm project evaluation did not evaluate flood proofing activities.²⁴

3. Community Flood Information System. The *Community Flood Information System*, (CFIS) project (2002-2007) was contracted by USAID to the Colorado-based company Riverside Technology, inc. along with Bangladesh-based partners Center for Environment and Geographic Information Services (CEGIS) and the Bangladesh Disaster Preparedness Centre (BDPC). The project's purpose is to reduce future vulnerability to flood damage in Bangladesh's flood plains. The project will develop an operational system that provides accurate and timely information on current and forecasted flood conditions for a part of Bangladesh's floodplain. The information will be disseminated to the local government and communities in a format that is understood and useful for flood mitigation at the community level. Replication of the system will be sought for larger floodplain areas through demonstration and awareness-building exercises for other flood-prone communities, government agencies, and potential development partners.²⁵

Specific activities implemented to date under the project include:²⁶

- Assessing the state of flood forecasting and monitoring in the floodplains and assessing the needs of community organizations that have roles in disaster mitigation.
- Developing a GIS and attribute database to provide flood information and imaging of flood-affected areas and collecting flood data.
- Building computerized modules for flood monitoring, simulation, and prediction
- Working with communities to determine their needs for flood information and facilitate community stakeholder discussions about project findings and integration with community mitigation activities.

4. Nutritional Surveillance Project²⁷ The Nutritional Surveillance Project (NSP) was a collaboration between Helen Keller International (HKI) and the Institute of Public Health Nutrition (IPHN) of the Government of Bangladesh. The NSP was established in 1990 to assist with disaster preparedness and help reduce the incidence of nutritional blindness and other disaster-related illnesses and nutrition deficits among Bangladeshi children through a nutritional/health surveillance system in flood-prone areas of Bangladesh. The project was a follow-on to a pilot surveillance system initiated by UNICEF and local NGO's in 1988.²⁸ It was modified in 1998 to provide data that are representative of each of the six divisions of Bangladesh and of the country as a whole. The project closed in 2002.

The NSP was one of the longest running surveillance projects in a developing country and is being used as a model for surveillance in other countries. It was unique in that it linked family socioeconomic status, agriculture, food security and child health/nutrition information in a single system. The NSP data collected in the project's 12 years provided an unrivalled means of detecting trends in nutrition and food security in Bangladesh. Accomplishments include:

- The NSP data have been used by the Government of Bangladesh to improve or develop nutrition and health programs, such as the national vitamin A capsule distribution program and the Bangladesh Integrated Nutrition Program.

- The data have also been used by USAID, international agencies, and local NGOs to develop policies and programs in health and agriculture that can improve the food security, nutrition and health of vulnerable groups in Bangladesh. NSP's flexibility made it easy to adapt data collection to meet USAID's need for data on the strategic objective indicator.
- The NSP provided key information that has led to improvements in programs and policies, and in setting international goals and targets. The information is important for program planning/development, determining resource allocation, program monitoring and evaluation, monitoring the country's progress towards international health and development goals, and designing nutrition policies.
- The NSP also provides useful information for advocacy in the areas of nutrition, health, gender, agriculture, and other important areas at national and international fora.
- While USAID funding for NSP has been discontinued, there continues to be substantial interest from the GOB, NGOs, and international organizations to continue the NSP's mandate to provide timely and comprehensive information on child and maternal health and nutrition, vitamin A, household economics, agricultural production, and disasters/crises. In December 2002, the Embassy of the Kingdom of the Netherlands/Dhaka, signed an agreement with HKI for a 2-year extension of the NSP – an indication of the value that agencies place on the NSP data.

Construction of Flood-proof Contraceptive/MCH Supply Storerooms

The Family Planning and Health Services project worked to improve the quality and the coverage of family planning and maternal/child health (MCH) services in Bangladesh. An August 31, 1989 amendment added \$1 million to be used, in response to the 1988 flood, to partially fund construction of some 200 flood-proof contraceptive/MCH supply storerooms.²⁹

EGYPT

1. Cairo Sewer – Operations and Management projects. Flooding due to the combination of natural conditions and increased urban and poor population led to a number of projects to overhaul Cairo's sewer system starting in the mid-1970s and leading into the 1990s.

2. Restoration and Preservation of Egyptian Antiquities Project. "In October and November of 1994, two flood events occurred in the Valley of the Kings, sending a warning to all heritage managers. In both cases, a local desert rainstorm occurred in the vicinity of the VOK. Storm-water runoff and sediment entered many of the tombs and caused erosion of gully floors. The SCA and ARCE responded by setting a project in place that would analyze the problems and implement a plan of action...Analysis of the 1994 flood events revealed that a response plan would be an essential element of a preservation program. In addition to producing a training guide with base information about the flood hazards, it was proposed to put in place equipment such as a water pump, air dryer, hand tools, and a transport vehicle. This equipment could be used to avert or minimize damage by future flash floods." (McLane and Wust, 2000; <http://crm.cr.nps.gov/archive/23-06/23-06-11.pdf>)³⁰

INDIA and NEPAL

Adaptive Strategies for Responding to Floods and Droughts in South Asia. Through this program, implemented by the Institute for Social and Environmental Transition, USAID/Nepal and OFDA supported the utilization of flood and drought coping strategies developed by local communities in India and Nepal and recommended new and more effective strategies for reducing vulnerabilities. The program began in September 2002 and continued until July 2004. Total OFDA funding was approximately \$300,000.³¹

This project represents an initial attempt to understand and disaggregate the factors that enable communities to adapt to floods, droughts and climatic variability by examining the courses of action households actually take during flood and drought events, and locating the insights generated in a wider

review of regional trends, government programs and systems theory. The project, the result of a unique collaboration between local grassroots organizations, regional non-governmental organizations, academic institutions, and international organizations working across South Asia, as a whole has been very successful.

Activities and accomplishments include:

- Collaboration among partners to develop a common understanding of the problem and agree on the best methodology.
- Case studies were conducted in drought- and flood-prone regions of Nepal and India.
- At the end of the field study period, data from all the field groups were collected, compiled and analyzed. The results were shared with all collaborating partners and the final project document was drafted as a collaborative effort between all project partners.
- The project document was finalized and published in the form of a book: *Adaptive Capacity and Livelihood Resilience: Adaptive Strategies for Responding to Floods and Droughts in South Asia*.
- A roundtable dialogue on adaptive strategies for responding to floods and droughts was organized, to which interested individuals and organizations working in the field of climatic variability and change and disaster management and relief from around the world were invited.
- The website provided details of the project's collaborating partners, the concepts behind the project and its objectives, details and maps of the four field survey sites, survey methodologies used, and a schedule and write-up of the major activities during the course of the project. The final project document is currently available on the website, an extension of ISET's website: www.i-s-e-t.org/asproject.³²

PAKISTAN

Pakistan Tribal Areas Development Project This project ran from 1982 to 1994. Total funding was \$22,800,000. Under the project, six groups of flood protection walls were constructed to protect 195 acres of land for 490 families. This was only one relatively small part of the overall project.³³

PHILIPPINES

1. Philippines Disaster Rehabilitation/Mitigation Work 1984-1989³⁴ USAID provided the Philippines with approximately \$4.1 million in disaster assistance grants during the four years ending September 30, 1989. About \$2.3 million was for emergency disaster relief (14 grants) and short-term rehabilitation assistance (10 grants), and \$1.8 million was in P.L. 40, Title II food assistance. Approximately \$170,000 in long-term rehabilitation assistance was used to train participants, purchase equipment, and construct evacuation centers, elevated concrete pathways, and concrete flood canals to prevent the accumulation of flood water within the community. Previously, water drainage was achieved through natural runoff. The activity highlighted the importance of ensuring compliance with any USAID restrictions regarding the use of short-term relief and rehabilitation funds for long-term, developmental assistance normally funded out of bilateral program funds.

3. Philippines Disaster Preparedness Workshop³⁵ USAID provided a grant of \$10,000 to support a Disaster Preparedness Workshop held in March 1988 under the auspices of the Government of the Philippines' Department of Social Welfare and Development for 35 Filipino public and private sector representatives. The workshop aimed at improving the capabilities of its attendees to provide local leadership in planning, implementing, and monitoring disaster-related programs and services to communities at risk. It also aimed to develop a mechanism for the continuing development of local leadership in disaster management. The workshop consisted of: (1) the presentation of key topics (preparedness, risk assessment, emergency services, mitigation, reconstruction, etc); (2) case studies of typhoons (Herming and Sisang), the 1986 flood of Metro Manila, fire risks, and displaced persons due to man-made conflicts; (3) simulation exercises dealing with local issues, with emphasis on coordination; (4) technical field visits; and (5) group papers, including an assessment of the Philippine Disaster

Management Program in terms of legislation and existing disaster preparedness plans, programs, and projects.

Eastern Europe and the New Independent States

REGIONAL

Regional Infrastructure Program in support of the Sava River Basin Initiative. The Sava River countries agreed to an Interim Action Plan that includes a set of projects that are under consideration for implementation. The IAP agreements include:

- 1) Integrated Water Management Strategy
- 2) Flood Protection Strategy
- 3) River Navigation Strategy

USAID and the Netherlands have supplied experts to assess, together with appointed country experts, the needs of the Sava Basin countries, and to discuss the project plans provided in the IAP. The consultants were asked to help bring the country project plans into a uniform state of completeness and consistency, establish initial project prioritization parameters and to gather information needed to develop a regional implementation and investment strategy.

Flood Control Strategy Programs:

- **Bosnia and Herzegovina:** Nine projects designed to renovate a system of canals, diversion structures and pumping stations to divert surface water from localities near the Sava River. The system has been in a state of disrepair since 1990.
- **Serbia – Montenegro:** Three projects to rehabilitate embankments along the Drina and Sava rivers to provide flood protection of the Macva region. The Macva region is in the lowlands of the Sava basin and is particularly vulnerable to floods.
- **Croatia:** In 1972 the Sava Basin control scheme was developed by a private consortium in cooperation with the United Nations Development Program and Yugoslav counterparts. The plan calls for the construction of large storage areas for excess waters, and conventional dikes, dams and spillways to divert and regulate the flow regime of the Sava river. Only 40% of the system was completed prior to the outbreak of war in the early 1990's. (Booz, Allen, Hamilton, 2003).³⁶

POLAND

Flood Mitigation Components of the East European Regional Housing Sector Assistance Project. The flood that affected Poland in July 1997 was enormous, covering 10% of the total land in Poland. More than 162,000 people were evacuated, and there was extensive damage to infrastructure. Government estimates placed losses at about \$2.4 billion. The USG's short-term assistance was followed by various programs to address medium- and long-term reconstruction needs, including financial support to Polish NGOs and the creation of the Gmina Assistance and Reconstruction Program, or GARP.³⁷ (A "gmina" is a unit of basic local self government.) USAID, working with gmina staff, NGOs, national municipal associations, contractors, and other organizations, developed GARP to work with selected gminas in the flood areas and to promote the exchange of information between donors and the victims of the flood. GARP had three major components: 1) technical assistance 2) finance, and 3) information facilitation. GARP played a major role in developing the *Flood Aid Fair* and the *Flood Aid Information System* – flood mitigation projects also supported by USAID.

Flood Aid Fair. The most unique approach under the information facilitation component of the Gmina Assistance and Reconstruction Program (GARP) was the "Flood Aid Fair." It was designed to promote market responses to demands for goods and services created by the flood. In all, 400 exhibitors ranging from humanitarian organizations, bi and multilateral donors, NGOS, and commercial firms were invited to the fair, free of charge. Among other successes and lessons learned, "information collected at the Flood Aid Fair exposed gaps in available resources to meet existing needs among the victims of the flood.

The Flood Aid Needs Board revealed the extent of outstanding needs among the victims of the flood and helped to direct resources where they are most needed [while it also] helped to build capacity among indigenous organizations....Municipalities benefited [as well] from information exchange that will facilitate an equitable distribution of resources for reconstruction.” (Mikelsons, 1998; http://www.dec.org/pdf_docs/PNACJ659.pdf)³⁸

Flood Aid Information System. A model “Flood Aid Information System” was another unique approach that yielded results. A guidebook was created to assist Polish local governments in managing flood prone areas through the development of proactive flood planning policies. The publication is aimed at helping local political leaders, government officials, and members of councils in the formulation of flood policies and in the implementation of flood planning activities. (“Strategic management,” 1998; http://www.dec.org/pdf_docs/PNACJ633.pdf.)³⁹

TAJIKISTAN

Emergency Relocation of Flood Affected Populations. In April 1999 Mercy Corps Intl. signed a \$700,000 grant agreement with USAID to assist flood affected populations in the Vose District of Tajikistan. The aim of the project was to construct a new community in a region that was not subject to flooding. The community was supplied with all the necessary utilities including electricity, sanitation facilities, and clean running water, and the newly constructed houses were built to withstand earthquakes measuring 8.5 on the Richter Scale. The project was completed in May 2000, with a total of 80 homes built to house 571 people.

Lessons Learned:

The Brick Problem – Flexibility, adapting to local conditions. The original plan called for the use of hand made, sun cured bricks. Delays resulted in the majority of the construction taking place during the winter months. Insufficient bricks were made to meet demand due to weather induced complications in production processes. Hand made bricks are vulnerable to wet weather and take longer to cure in the cold. Project managers solved the problem by purchasing a limited amount of gas fired bricks from a local manufacturer that were impervious to environmental conditions. In addition, recycled bricks were procured from a demolition company that was removing derelict buildings from the region. These bricks were used to construct the exterior shell of the homes, while the handmade bricks were used to construct the interior walls. The result was that overall cost of each house was reduced, the construction quality remained high, and the project was finished on time

Worker Motivation – Incentive structures work. The work was carried out under the UNWFP Food for Work Program. Worker motivation was initially a problem due in part to worker perception of untimely and inadequate compensation, and systems that were in place from the years of the USSR which fostered inefficient work practices. Project management addressed these problems by instituting productivity bonuses which increased worker productivity. In the summer, when other cash paying jobs became available, Project Management offered small cash incentives in addition to food allocations to retain skilled labor.⁴⁰

Latin America and the Caribbean

REGIONAL

1. Cooperative Housing Foundation Mitigation initiative for communities and municipalities (MICAM), El Salvador, Guatemala, and Honduras⁴¹. The program was funded in response to a request made by Presidents of Central America to the U.S. Government within the framework of the Hurricane Mitch Post Disaster Response Effort. The MICAM project took place between February 2001 and October 2002. The major MICAM Program objectives were to:

- 1) Enhance local risk management capability in vulnerable areas
- 2) Stimulate dialog between government and the private sector in order to identify the most appropriate mechanisms for private sector participation in risk management
- 3) Assure coordination, prevent duplication and improve networking for emergency management
- 4) Increase the capacity of Salvadoran schools located in high risk areas in risk management and disaster preparation.

Activities included enhancing local capacity to deal with disasters through organizing and training local committees, carrying out vulnerability and risk assessments, and preparing and prioritizing emergency plans. Infrastructure projects included constructing and cleaning out drainage gutters and pipelines, building bridges, setting up radio systems, and dredging rivers to clean out debris to lessen the chances of future floods.

Lessons learned:

- Lack of adequate education levels and training of the community and its leaders and/or support provided by the community members to community leaders occasionally resulted in the termination or suspension of the mitigation project. This can be avoided by working closely with the community and their leaders and by making every effort to create greater levels of understanding regarding the intentions of leadership to improve the living conditions of all residents of the community.
- Getting urban, marginal communities to focus on risk preparedness and disaster mitigation can be a real challenge given the extreme poverty, high physical and environmental vulnerability, and growing delinquency concerns.
- Successful risk management and mitigation projects demonstrate to the community that they share common problems and can make a difference in their lives by working together with, rather than criticizing local authorities.
- Women and adolescents proved to be very receptive toward the planning and development of risk management and mitigation. These groups should be considered important actors with similar programs that may be implemented in the future.

2. Natural Hazards Mitigation Project (NHP) of the Organization of American States for Caribbean, Central and South American Countries 1983-91.⁴² This project was undertaken by the Organization of American States Office of Regional Development and Environment. It began in July 1983 as a small “pilot” activity with funding of \$95,000. In 1987 the NHP was extended through 1991 with a new grant agreement of “up to \$1.1 million.” and covered a wide range of Caribbean, Central and South American countries. There were 79 specific training and mitigation activities undertaken by this project.

The evaluation team was unable to measure quantifiable impacts of the NHP. This was due to the relatively short period of NHP activities in the countries included in this evaluation which precluded a rigorous analysis of their economic and financial benefits. However, the evaluators thought that the

project had established an important base of experience and capability in the field of natural hazards management in the region.

Other lessons learned included:

- Sector-specific hazard vulnerability assessments should be the major focus of future programming. These appear to facilitate the concentrated attention of national government, bilateral donor and multilateral lending agency technicians and decision-makers, and may be the best means of insuring the enactment of mitigation measures. However, regular and coherent follow-up to such specific activities appears to be crucial to the success of such studies.
- Activities such as the installation of EIS and GIS systems and the sponsorship of expensive, generalized hazard management training unrelated to specific activities should be deemphasized. The effectiveness of such systems and training appears greatly enhanced by having them relevant directly to specific investment projects or sectors. If the OAS is to continue to influence generalized training--as it is well equipped to do--this should probably be done in league with other donors, including A.I.D.
- Careful consideration should be given to continued funding of a further, well-designed OASDRDE NHP activity. Acceptance of the importance of natural hazards management is growing and progress to date in encouraging this should not be sacrificed. Measurable, tangible impacts for such activities should not be expected in the short-term. Preparations for this type of activity should include agreement on indicators and means of measurement over the long-term.
- The feasibility of Mission buy-ins to sector-specific hazard vulnerability assessments should be explored in future grant agreements.

3. Caribbean Disaster Mitigation Project 1993-99 \$5 million⁴³ The Caribbean Disaster Mitigation Project (CDMP) is a \$5 million technical assistance project, funded by OFDA and carried out by the Organization of American States. The project began in September 1993 and was to be completed by December 1999. The program objective is the adoption of disaster mitigation and preparedness techniques, technologies, and practices by the public and private sectors in targeted communities. To support this objective, CDMP sought to achieve three program results: undertake pilot activities to promote increased knowledge and better practices; increase the pool of public and private sector professionals with disaster mitigation skills, and incorporate of mitigation activities in post-disaster programs.

There were nine main project outcomes including:

- reduced vulnerability of basic infrastructure and critical public facilities
- improved building standards and practices
- increased availability and access to natural hazard/disaster risk information for used by public and private sector developers and insurers
- increased community awareness of and involvement in disaster preparedness and mitigation
- improved ability of public sector and private property insurers to link premium structure to risk
- incorporation of mitigation activities in post-disaster efforts
- mitigation policy and planning
- activities with development finance institutions
- training

CDMP consisted of specific activities corresponding to these outcomes taking place in Jamaica, St. Lucia, Dominica, Antigua and Barbuda, Grenada, Belize, Haiti, the Dominican Republic, St. Kitts and Nevis, and St. Vincent and the Grenadines. The OAS managed the project. There were coordinators in three different countries with responsibilities for different parts of the region. There was also a technical advisory committee (TAC) including representatives of OFDA, USAID missions in the region, and regional agencies involved in disaster management.

4. Hurricane Mitch special objective: Improved Central American regional capacity to mitigate transnational effects of disasters , 1999-2001 \$13,500,000⁴⁴ This regional program had four objectives:

IR 1: Framework Established for Sound Transnational Watershed Management. \$4,000,000.

Key IRs: (1) Effective institutional arrangements for watershed management; (2) Joint watershed management and disaster mitigation plan developed; and (3) Information base and tools for decision making in place.

Results summary: (1) A state-of-the-art forecast system for the transnational Río Lempa watershed was designed, installed and is fully functional. (2) A joint management plan that identifies geographic and thematic priorities among a broad spectrum of stakeholders and that lays out a tri-national program that includes institutional arrangements for disaster mitigation, natural resources management and improved livelihoods along the watershed was developed and implemented. (3) To make the Río Lempa forecast system work, sub-systems including meteorological data rescue, coordination of meteorological institutions, development of a geographic information system, and an accumulated rainfall model all have been put in place and are functioning.

IR 2: Regional Guidelines and Standards Developed to Reduce Road Network Vulnerability to Natural Disasters. \$500,000.

Results summary: (1) Five manuals, (a) Road construction manual, (b) Road maintenance manual, (c) Standards for road signs, (d) Standards for geometric design of roads, (e) Limits to weights and dimensions of vehicles, were researched and produced. (2) The manuals were distributed to each Ministry of Transport in each of the five Mitch-affected countries (Guatemala, El Salvador, Honduras, Nicaragua and Costa Rica), and to national and international institutions.

IR 3: Costa Rican Education System Capacity Upgraded in Selected Communities Affected by Mitch Related Nicaraguan Migration. \$4,983,000.

IR4: Strengthening regional policies that reduce energy system vulnerabilities to disasters. \$4,200,000.

Key IRs: (1) Regional energy sharing advanced; (2) Improved efficiency of the energy sector through restructuring; and (3) Promote renewable energy and equity (especially for economic reactivation).

Results summary: (1) Emergency energy plans drafted for El Salvador, Guatemala, Honduras and Nicaragua. (2) Helped create Regional Power Operator to facilitate regional interconnection issues; developed transitional regulations and procedures for regional energy interconnection. (3) Benefited 2,045 families with new service either to the grid or renewable energy.

CHILE

Tsunami hazard reduction using system technology (THRUST) 1985-86⁴⁵ This USAID-funded project examined existing technology and the extent to which an early warning system could be designed to fill the gap in nations with minimal or no regional warning system. The project implementer, the US National Oceanic and Atmospheric Administration (NOAA) selected Chile as a pilot for applying the technology.

ECUADOR

Disaster prevention and preparedness project⁴⁶ A grant was provided to the United Nations Disaster Relief Organization (UNDRO) to continue its efforts to strengthen the capability of Ecuador and neighboring countries to respond to natural disasters with the aim of saving the most lives possible. The project investigated the economic and social impacts of common natural disasters and developed emergency plans for the protection of the population and property. These included education, training of population and the authorities, evaluation exercises, public information and establishment of natural

hazard monitoring, warning, and alarm systems. Additionally, elaboration of hazard and risk maps helped make it possible to locate engineering works in the safest and most economic places.

Principal tasks were as follows.

- (1) All cycles of disaster mitigation activities completed for each high-probability, high-impact disaster type which is expected to occur in the future. This included preparedness for earthquakes, flooding, volcanic eruptions, landslides, and tsunamis.
- (2) National scientific and technical institutes participated actively in hazard evaluation, risk assessment, the preparation of risk maps, and the establishment of monitoring systems and alert procedures.
- (3) The project continued to expand the activities of the Civil Defense to involve more of the Provincial Juntas in systematic preparedness planning for particular scenarios and, through them, continued to stimulate the awareness and involvement of local community leaders and the population in general.
- (4) Educating the public in disaster mitigation and preparedness through the use of public broadcasting, publications, and schools was continued.

EL SALVADOR

Cooperative Housing Foundation. [Hurricane] Mitch integrated reconstruction activity (MIRA)⁴⁷

Program accomplishments included:

- MIRA reached its goal of building 500 homes in 33 communities, incorporating innovative and demonstrative designs that mitigate the impact of natural disasters and benefiting more than 2,500 hurricane victims. None of the CHF-built houses suffered significant damage during the earthquakes of January and February 2001.
- Working closely with local officials and communities, MIRA built, repaired, or equipped 83 damaged or disaster-prone schools (104% of target), benefiting 212 communities and 18,942 students. MIRA also completed protective works around schools built by others and mobilized the donation of local in-kind assistance, as well as of \$3,000 from U.S. NGOs for the purchase of books and classroom materials for the most needy schools.
- MIRA reforested 533 ha, including 292.32 ha from trees produced in community nurseries. Efforts focused on steep slope and riverbank stabilization, but included agroforestry and mangrove swamp reforestation. MIRA also completed soil and water conservation activities in 36 micro-watersheds covering 197.27 ha.
- Besides introducing innovative community-led marches, campaigns, and clean-ups, the projects brought intensive training and practical experience to hundreds of households and were a major vehicle for combating the dengue epidemic.
- In the disaster preparedness component, CHF and Partners of the Americas (POA) trained 3,015 community members (125% of target), 48% of them women; established emergency committees in 118 communities; and gave the latter workshops in areas such as first aid, rescue techniques, shelter management, and damage and need evaluation.
- Emergency plans were completed in all 10 original municipalities, and 52 municipal staff members were trained. CHF and POA also trained 146 disaster preparedness trainers, mainly local health promoters. When the earthquakes of January and February struck, the communities were well prepared.
- In the environmental hazards mitigation component, funded by the Office of Foreign Disaster Assistance (OFDA), CHF, with support from the Federal Emergency Management Agency (FEMA), helped establish the Berlin Risk Management Committee (COMIR), whose broad representation helps define the type and location of mitigation works and also obtain cost sharing from the public and private sectors. Mitigation works focused on steep, vulnerable slopes, and consisted of the construction of 14,500 water absorption pits, 80 large water infiltration wells, and 10,700 meters of vegetative barriers to stop soil and water runoff. A total of 167 people were trained in conservation techniques.

- Finally, the emergency management systems component, also funded by OFDA, purchased equipment for the 5 targeted Emergency Operations Centers (EOCs) -- the National Emergency Committee (COEN), and the Departmental EOCs in Usulután, San Vicente, La Paz, and San Miguel. The component also reviewed and strengthened EOC manuals and purchased equipment for communities and municipalities, as well as equipment to help COEN communicate with communities along the Lempa River linked to the CEL hydroelectric dam. Twenty communities in San Luis Herradura and Berlin municipalities received disaster preparedness training.

GUATEMALA

Hurricane Mitch 1999-2002⁴⁸ This project ran from 1999 to 2002. A flood mitigation component, “IR 1: Disaster Preparedness Enhanced”, is discussed below.

Lessons from Hurricane Mitch pointed to clear weaknesses in the national network of disaster response, from poor communications between central and local disaster coordination committees to the absence of identified logistical support channels and arrangements. Despite a 1996 law creating a decentralized civilian national emergency management agency, CONRED, little had been done to implement the new system. Following Hurricane Mitch, the GOG made systematic preparation for future disasters one of its highest priorities. The USG response was to provide \$5.5 million to enhance disaster preparedness. USAID directly managed \$1.5 million, and \$4 million were implemented through Inter-Agency Agreements with other USG agencies.

At the close of the two-year Hurricane Mitch Reconstruction program, USAID/Guatemala was very confident that CONRED is much better prepared to respond to future disasters. Equally as important, a national system has begun to take shape with a hierarchy of responsibilities becoming manifest in the form of municipal and local disaster coordination units. Finally, the combination of efforts to strengthen both CONRED and INSIVUMEH, Guatemala’s national meteorological institute, laid a solid foundation for the implementation of activities directed not only at disaster response, but to mitigation and prevention as well.

Key lessons:

- This activity was a novel experience for USAID/Guatemala and its partners. While the successes are considerable in terms of quality and quantity, the duration and funding was too short and limited. Particularly with respect to the formation of local and municipal coordination units, additional time and resources would have led to not only a greater number being formed, but a greater consolidation of a national system would have taken place.
- The collaboration of USG agencies under the Mitch Reconstruction program proved to be very valuable in this IR. The different agencies brought different strengths and capabilities to the task. Most obvious were the technical strengths of NOAA and USGS, but the most surprising was FEMA, complementing OFDA’s traditional disaster response capability with effective organizational talents and mitigation and prevention approaches.
- Because the formation of community committees involved the entire community, men, women and children, the impact was very positive.
- In Guatemala, there is no prior experience with the concept of disaster mitigation; this concept was introduced through this activity.
- CONRED’s institutional capacity to provide follow up at the community level (where coordination units were formed under this project) is limited, but should be encouraged.
- Both CARE and CRS gained entry-level experience with disaster preparedness. Consequently, both agencies acquired an appreciation for the importance of the concept and have stated they will be incorporating disaster preparedness and risk management in all future development projects.

HAITI

Hurricane Georges Recovery Program 1999-2001 \$9,800,000⁴⁹ Hurricane Georges swept across Haiti in September 1998, leaving 400 casualties and \$180 million in damages. The US Government responded in three phases: 1) \$1.25 million for immediate relief items and emergency food assistance, 2) \$12.5 million for rehabilitation of damaged infrastructure such as irrigation systems and provision of planting materials to affected farmers, and 3) \$9.8 million for longer-term recovery. The third phase, called the Hurricane Georges Recovery Program (HGRP), was funded from supplemental funds appropriated by Congress in May 1999. Activities under the HGRP ended December 31, 2001.

Twenty-two targeted communities received an integrated package that included raising agricultural productivity and revenues; rebuilding infrastructure; protecting small watersheds; and providing training and public awareness on disaster mitigation, preparedness and response. This summary will cover only protecting watersheds and providing training/increasing public awareness, which were relatively small components in financial terms of the overall program.

Anecdotal evidence from Hurricane Georges and events in other countries have shown that where farmers use improved soil and water conservation practices, far less damage occurs from flooding. Activities promoted environmentally sustainable agricultural practices while installing structures that slow rainwater runoff and reduce soil erosion in critical ravines. They included the use of physical and biological barriers such as hedgerows, rock walls and check dams and the planting of tree seedlings and other plants such as bamboo and elephant grass. Overall 41,000 m³ of check dams were built along 85 km of ravines. About 15 km of contour canals, 494 km of hedgerows and 99 km of rock wall were built on the hillsides next to the ravines and over 600,000 trees were planted. The micro-watersheds that were protected encompassed over 1,100 hectares. Though not measurable under the short timeframe of this program, it is anticipated that these structures will reduce rainwater runoff and potential local impacts from flooding. The types of soil and water conservation structures installed on the hillsides have resulted in increased agricultural productivity in other USAID/Haiti programs and they are expected to have the same impact at HGRP sites. Several of the soil and water conservation activities were implemented in conjunction with irrigation repair projects so that runoff to and sedimentation in these nearby irrigation systems would be reduced.

More than 5,000 people were trained in disaster preparedness and mitigation. Twenty-two disaster mitigation and preparedness committees (called civil protection committees) were established. These committees have developed disaster action plans for their communities and are formally linked to the national Civil Protection Directorate (DPC) through departmental committees. Not only are these committees established but, according to a household survey conducted in October 2001, 50% of the respondents were aware of the committees and 25% were aware of the contents of the disaster plan. In those communities where the HGRP has been implemented, 90% of the participants in the household survey were able to name at least one action that can reduce the effects of a natural disaster; 33% could name three or more. People in these resilient communities now know that they can help themselves to be more resistant to the whims of nature and will take action both before and after a disastrous event. Building on the success of this component, the Mission funded a follow-on award for technical assistance to local and municipal committees to begin implementing their action plans before the beginning of the next hurricane season.

NICARAGUA

Nicaragua special objective -- Hurricane Mitch reconstruction program⁵⁰ This program ran from October 1998 to December 2001. It was funded at \$103 million, plus \$12 million in other USG assistance coordinated by USAID Nicaragua. This program was implemented in the 10 departments directly affected by Hurricane Mitch. (*Flood mitigation played a significant role in reconstruction efforts, but it was not possible to determine its size from the documentation available.*)

Activities with a mitigation component included:

- 51,000 households in 980 communities benefited from food for work programs for road rehabilitation which had a flood mitigation component, out of a total of 210,000 families benefited from USAID Hurricane Mitch assistance. More than 1,500 kilometers of roads were improved or rehabilitated.
- Nearly 14,000 hectares of watersheds were protected with stabilization efforts, exceeding the target of 8,000 acres. These included clearing and stabilizing stream and drainage channels, reforestation, slope and gully stabilization, rehabilitation and construction of municipal storm drainage systems, dike repair and construction to protect key buildings from floods. In addition, 1,500 hectares of Mitch-damaged cropland were reclaimed.
- Residents of remote mountainous communities were trained to repair tertiary roads themselves, increasing their self-reliance in the face of disasters.
- 2,700 hand-dug wells and 300 deep drilled wells were rehabilitated or built, as were 7,200 latrines
- 220 radios and six repeater stations were installed at 150 health posts.

¹ Glaeser, Edward A. and Randolph S. Lintz,. 1992 "Evaluation of AID's Office of Foreign Disaster Assistance's grant to the Organization of American States in support of its natural hazards mitigation project." Washington: USAID. PD-ABG-059. http://cdie.usaid.gov/pdf_docs/PDABG059.pdf

² "Promoting Village Participation in Disaster Mitigation: The USAID/Niger Disaster Preparedness and Mitigation Project." Part of the series, *Participatory Practices: Learning from Experience*. http://www.usaid.gov/about/part_devel/docs/prtpract7.html.

³ "Promoting Village Participation in Disaster Mitigation: The USAID/Niger Disaster Preparedness and Mitigation Project." Part of the series, *Participatory Practices: Learning from Experience*. http://www.usaid.gov/about/part_devel/docs/prtpract7.html.

⁴ Mikelsons, Maris, Krzysztof Chmura, and Ewa Strumillo-Kudlak. "Flood aid fair in Poland: a method to promote information exchange." Prepared by The Urban Institute for USAID, September 1998. http://www.dec.org/pdf_docs/PNACJ659.pdf

⁵ Mercy Corps International (July 2000) USAID final program report : emergency relocation of flood affected populations, Vose District, Tajikistan -- grant number 119-0001-G-00-9006[-00] : period to program completion 31st May 2000. USAID Regional Mission for Central Asia, USAID Mission to Tajikistan. http://www.dec.org/pdf_docs/PDABS367.pdf

⁶ Adams, B. et al. 2002. *OFDA [Office of Foreign Disaster Assistance] 2001 annual report*, p. 12. USAID: Washington. http://www.dec.org/pdf_docs/PDABW905.pdf

⁷ Dennison, Steven E., John Durant and Michael Fritzsche. "Evaluation of USAID/Madagascar's Cyclone Recovery Program (CRP)." Submitted to USAID in response to Contract No. AEP-I-00-00-00023-00 by Development Associates, Inc. October 24, 2002.

⁸ Lippe, Michael and Lynette Atwell. 1999. "Final evaluation: Caribbean disaster mitigation project." Washington: USAID. PD-ABR-594. http://www.dec.org/pdf_docs/PDABR594.pdf

⁹ Lippe, Michael and Lynette Atwell. 1999. "Final evaluation: Caribbean disaster mitigation project." Washington: USAID. PD-ABR-594. http://www.dec.org/pdf_docs/PDABR594.pdf

¹⁰ Mercy Corps International (July 2000) USAID final program report : emergency relocation of flood affected populations, Vose District, Tajikistan -- grant number 119-0001-G-00-9006[-00] : period to program completion 31st May 2000. USAID Regional Mission for Central Asia, USAID Mission to Tajikistan. http://www.dec.org/pdf_docs/PDABS367.pdf

¹¹ Lippe, Michael and Lynette Atwell. 1999. "Final evaluation: Caribbean disaster mitigation project." Washington: USAID. PD-ABR-594. http://www.dec.org/pdf_docs/PDABR594.pdf

¹² USAID Guatemala. 2002. "Activity completion report: Guatemala Mitch special objective : rural economy recovers from [Hurricane] Mitch and is less vulnerable to disasters (520-007) Washington: USAID Guatemala. PD-ABW-331 http://www.dec.org/pdf_docs/PDABW331.pdf

¹³ *Southern Africa Development Community Disaster Management Committee and Technical Seminar*. Vol. 1 & 2; 6-9 December 2000 in Harare, Zimbabwe. Submitted by International Resources Group, Ltd. to USAID, January

2001. [http://www.irgld.com/Resources/Publications/Africa/2001-](http://www.irgld.com/Resources/Publications/Africa/2001-01%20SADC%20Disaster%20Management%20Seminar%20Vol%20I-Africa.pdf)

[01%20SADC%20Disaster%20Management%20Seminar%20Vol%20I-Africa.pdf](http://www.irgld.com/Resources/Publications/Africa/2001-01%20SADC%20Disaster%20Management%20Seminar%20Vol%20I-Africa.pdf).

¹⁴ “PVO Development Initiatives” in Chad. Contract No. AFR-0051-A-00-7056-00. May 1987 through September 1989. PD-FBD-767.

¹⁵ OFDA FY2000 Annual Report, pp. 25-26.

http://www.usaid.gov/our_work/humanitarian_assistance/disaster_assistance/publications/annual_reports/pdf/AR2000.pdf.

¹⁶ Dennison, Steven E., John Durant and Michael Fritzsche. “Evaluation of USAID/Madagascar’s Cyclone Recovery Program (CRP).” Submitted to USAID in response to Contract No. AEP-I-00-00-00023-00 by Development Associates, Inc. October 24, 2002.

¹⁷ Concurrent Audit of USAID/Madagascar’s Performance Monitoring of Selected Health Services funded by the Southern Africa Floods Supplemental Appropriation Report No. 4-687-02-005-P June 21, 2002.

<http://www.usaid.gov/oig/public/fy02rpts/4-687-02-005-p.pdf>.

¹⁸ OFDA FY2000 Annual Report, pp. 25-26.

http://www.usaid.gov/our_work/humanitarian_assistance/disaster_assistance/publications/annual_reports/pdf/AR2000.pdf.

¹⁹ Audit of USAID/Mozambique’s Performance Monitoring of Road Repair and Reconstruction Activities Funded by the Southern Africa Floods Supplemental Appropriations Audit Report No. 4-656-03-001-P January 31, 2003.

<http://www.usaid.gov/oig/public/fy03rpts/4-656-03-001-p.pdf>.

²⁰ “Promoting Village Participation in Disaster Mitigation: The USAID/Niger Disaster Preparedness and Mitigation Project.” Part of the series, *Participatory Practices: Learning from Experience*.

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²¹ Stephenson, James. E. “Baardheere Dam Project – Somalia. Summary Review of Project Design.” Developed for USAID, January 1986. PD-ABJ-214, Design/implementation workplan.

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